

## **Title: Creating a Symmetrical Design**

### **Link to Outcomes:**

- **Problem Solving** Students will develop and apply strategies to solve a problem.
- **Communication** Students will relate physical materials to mathematical ideas.
- **Reasoning** Students will justify their answers and solution process.
- **Connections** Students will link conceptual and procedural knowledge of mathematics with other disciplines.
- **Geometry & Spatial Sense** Students will develop a spatial sense of a physical object and apply the concept to the creation of a symmetrical design.
- **Patterns & Relationships** Students will recognize, describe, extend, create and explain a pattern.

### **Brief Overview:**

This unit teaches students the meaning of symmetry by having them manipulate a variety of objects. Using this knowledge, they will create a symmetrical design and write an informative paragraph about the quilt design and the importance of symmetry.

### **Grade/Level:**

Grade 3 (both Mathematics and Language Arts)

### **Duration/Length:**

This lesson lasts for three 50-60 minute class periods.

### **Prerequisite Knowledge:**

- Ability to identify plane figures such as triangles, squares, circles and rectangles.

## **Objectives:**

Students will be able to:

- identify lines of symmetry in a variety of geometric figures and objects.
- construct a symmetrical design.
- write a description of their designs in paragraph form.

## **Materials/Resources/Printed Materials:**

- Cut outs of regular and irregular geometric shapes
- Scissors
- Paper
- Pencil
- Crayons
- One set of upper case block letters per group of 2-4
- Inch square graph paper

## **Development/Procedures:**

### Task 1

- Distribute several cut outs of various geometric shapes to each student. Have the students fold each figure in two, trying to overlap the parts exactly. Inform students that the line on the fold is called a line of symmetry.
- The students will locate other lines of symmetry in each figure, identifying figures that have more than one line of symmetry. They will share their discoveries with their partners.
- The students will make a larger square, triangle, rectangle, and circle than previously used. Working with a partner, the students will locate all of the lines of symmetry (when possible ) in these larger shapes. Compare the number of symmetrical lines in both sizes of shapes. Direct the students by asking such questions as: does the size of the shape change the number of symmetrical lines?
- Distribute a set of upper case block letters to groups of 2-4 students. Have students identify the letters that are symmetrical by folding the shapes and recording the results on the worksheet provided. For each asymmetrical letter, students create a symmetrical design using that letter and marking the line of symmetry.

## Task 2

- Show a quilt or pictures of quilts to the students. Discuss the characteristics of quilts with the students, having them identify symmetrical patterns in the quilts shown. Discuss with the students the type of process that they would need to follow in order to create their own symmetrical design. Have them think of the pattern they would like to create.
- The teacher will distribute an inch square worksheet to each student. As a group, the students will locate and mark the center line of symmetry. Each student will use a worksheet to create a symmetrical pattern of their own.

## Task 3

- The students will write a paragraph which explains their quilt design. They should tell of the importance of symmetry when creating a quilt pattern. The teacher may choose to begin this task by asking such questions as: if you had to tell a story based on your quilt design, what would it be about and why?

## Evaluation:

Teacher observes the students' folded manipulatives and checks for correctness in symmetry of design. Evaluation of the descriptive paragraphs is based on the following rubric:

4:

- Consistently complete sentences
- Completely explains design, with thorough details
- Provides several reasons for the importance of symmetry
- Thorough development of story, reflecting a beginning, middle, and end

3:

- Satisfactorily complete sentences
- Completely explains design with some details
- Provides adequate reasons for the importance of symmetry
- Adequate development of story, reflecting a beginning, middle, and end

2:

- Weak sentence structure
- Partially explains design, with some details
- Provides weak reasons for the importance of symmetry
- Weak development of a story, no ending

1:

- Few/no complete sentences
- No explanation or details
- Provides no reason for the importance of symmetry
- No structure exists within the story

### **Extension/Follow Up:**

- Read *The Patchwork Quilt* by Valerie Flourney, or another story relevant to quilting. Use a Venn diagram to compare your quilt with the quilt in the story.
- In pairs the students will decide how they might obtain the information to make a real quilt. Possible decisions to be made: *be where would you get the money, what types of fabrics are needed, the size of the quilt, other supplies needed (thread, needles, sewing machine) etc.*
- Write a letter to someone special for permission/materials/money to create a symmetrical quilt. Be sure to state your position and give four reasons why you should be allowed to make this symmetrical quilt.
- Look back over the design and see if you notice any type of pattern which was not planned, tell your discoveries to another classmate.
- Gather several types of fabric to design a real symmetrical quilt. Work as a class to decide on the pattern, then work on the quilt as time allows. Place the unfinished quilt in a designated classroom area to be worked on during free time. Students may work on the individual squares. Parental help may be enlisted to assist with the stitching.

### **Authors:**

Tracy Elzey  
Federalsburg Elementary  
Caroline County

Betty Jean Mumford  
Ridgely Elementary  
Caroline County

Name \_\_\_\_\_

Date \_\_\_\_\_

**Fold the set of upper case block letters to find the line or lines of symmetry. Then record your findings on this worksheet. For each letter that does not have a line of symmetry, create a symmetrical design using that letter. Show the line of symmetry in that design.**

**A      B      C      D      E      F**

**G      H      I      J      K      L**

**M      N      O      P              Q**

**R      S      T      U              V**

**W      X      Y      Z**

